

### **REMARKS**

By the present amendment, claims 1, 9, and 16 have been amended. Thus, after the present amendment, claims 1-20 remain in the present application. Reconsideration and allowance of outstanding claims 1-20 in view of the above amendments and following remarks are requested.

#### **A. Objections to the Drawings**

The Examiner has objected to Figure 1 as failing to comply with 37 CFR §1.84(c). As mentioned herein, the attached replacement sheet of drawings includes changes to Figure 1. This sheet, which includes Figure 1, replaces the original sheet including Figure 1. In Figure 1, the legend "Prior Art" has been added. Applicants respectfully submit that the objections to the drawings should be withdrawn.

#### **B. Rejections of Claims 1-20 under 35 USC §103(a)**

The Examiner has rejected claims 1-20 under 35 USC §103(a) as being obvious with respect to U.S. Patent Number 6,693,321 to Zheng, et al. ("Zheng") and "Applicant's admitted prior art as disclosed in figure 2 . . ." For the reasons discussed below, Applicants respectfully submit that the present invention, as defined by amended independent claims 1, 9, and 16, is patentably distinguishable over Zheng.

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Applicants respectfully submit that Figure 2 is not directed to prior art. Figure 2 relates to an embodiment according to the present invention. Applicants will proceed on the assumption that the Examiner intended to refer to Figure 1 of the present application.

As disclosed in the present application, a high-k dielectric stack is situated between an upper electrode and a lower electrode of a MIM capacitor. The high-k dielectric stack comprises a first high-k dielectric layer, the first high-k dielectric layer having a first dielectric constant. An intermediate dielectric layer is situated on the first high-k dielectric layer, the intermediate dielectric layer having a second dielectric constant. A second high-k dielectric layer is situated on the intermediate dielectric layer, the second high-k dielectric layer having a third dielectric constant. The second dielectric constant is not greater than the first dielectric constant and the third dielectric constant.

In embodiments according to the present invention, the intermediate dielectric layer forms an interface with each of the first high-k dielectric layer and the second high-k dielectric layer. The formation of these interfaces can impede electron flow between upper and lower electrodes of MIM capacitor 202. Consequently, the high-k dielectric stack according to embodiments of the present invention advantageously achieves reduced leakage current and increased breakdown voltage.

In order to further illustrate aspects of the present invention, independent claims 1, 9, and 16 have been amended to recite "wherein said intermediate dielectric layer forms an interface with each of said first high-k dielectric layer and said second high-k dielectric

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layer to impede electron flow between said upper and lower electrodes of said MIM capacitor."

In contrast to the present invention as defined by amended independent claims 1, 9, and 16, Zheng discloses floating gate 18, intergate dielectric layer 24 and control gate 32. Intergate dielectric layer 24 comprises first layer 26, second layer 28, and third layer 30. Applicants respectfully disagree with the Examiner's assertion that Zheng and Figure 1 of the present application teach, disclose, or suggest a high-k dielectric stack between an upper electrode and a lower electrode of a MIM capacitor. Zheng is directed to memory devices and is not related to capacitors. The floating and control gates of Zheng are made of polysilicon and are not being used as electrodes of a MIM capacitor, but rather are being used for memory purposes. Therefore, Zheng and Figure 1 of the present application are non-analogous and there is no teaching or suggestion to combine or modify Zheng and Figure 1 of the present application to achieve the elements of amended independent claims 1, 9, and 16.

Further, column 7, lines 25-28 of Zheng teach that second layer 28 is made of a high-k material with a dielectric constant less than the dielectric constant of first layer 26. This teaching is in contrast to the teachings of the present invention of intermediate dielectric layer 220 between high-k dielectric layers 216 and 218.

For the foregoing reasons, Applicants respectfully submit that the present invention as defined by amended independent claims 1, 9, and 16 is not taught, disclosed, or suggested by the art of record. Thus, amended independent claims 1, 9, and 16 are

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patentably distinguishable over the art of record. As such, the claims depending from amended independent claims 1, 9, and 16 are, *a fortiori*, also patentable for at least the reasons presented above and also for additional limitations contained in each dependent claim.

For the foregoing reasons, Applicants respectfully submit that the present invention as defined by amended independent claims 1, 9, and 16 is not taught, disclosed, or suggested by the art of record. Thus, amended independent claims 1, 9, and 16 are patentably distinguishable over the art of record. As such, the claims depending from amended independent claims 1, 9, and 16 are, *a fortiori*, also patentable for at least the reasons presented above and also for additional limitations contained in each dependent claim.

**B. Conclusion**

Based on the foregoing reasons, the present invention, as defined by amended independent claims 1, 9, and 16, and the claims depending therefrom, is patentably distinguishable over the art cited by the Examiner. Thus, outstanding claims 1-20 are patentably distinguishable over the art cited by the Examiner. As such, and for all the foregoing reasons, an early Notice of Allowance directed to all claims 1-20 remaining in the present application is respectfully requested.

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Respectfully Submitted,  
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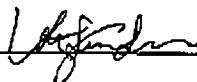
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